

# Electronic Supplementary Information

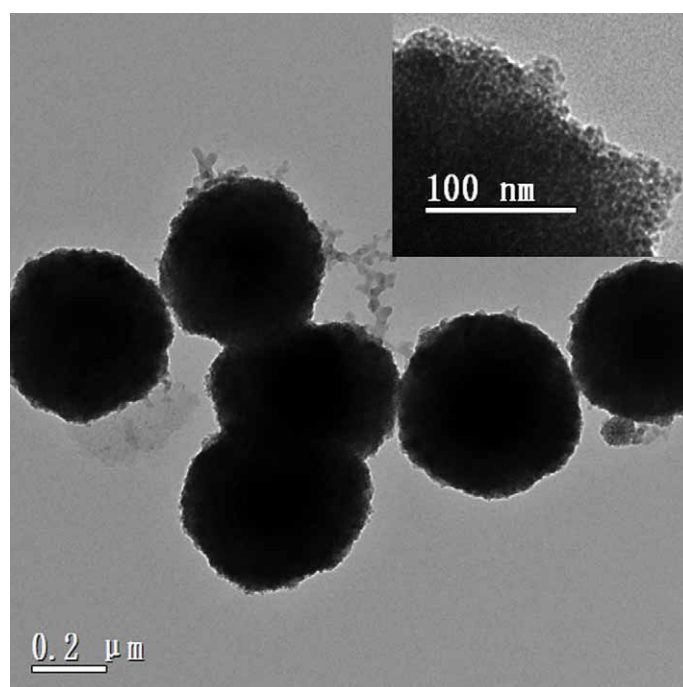
Tailored anisotropic magnetic conductive film assembled from  
graphene-encapsulated multifunctional magnetic composite microspheres

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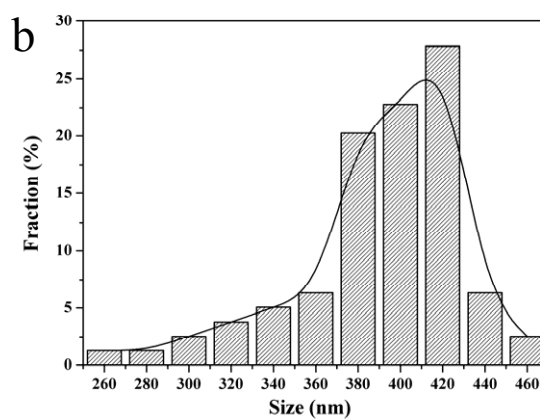
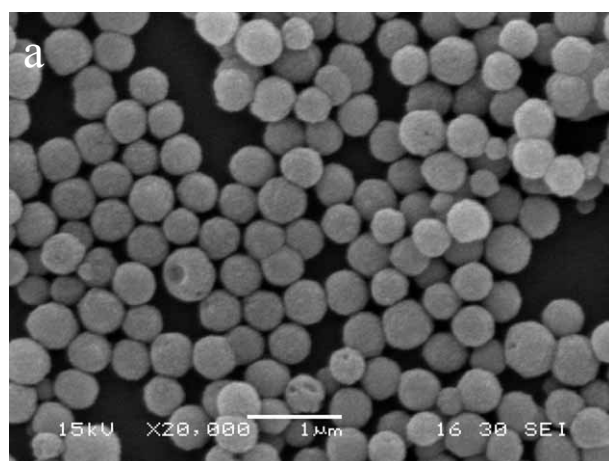
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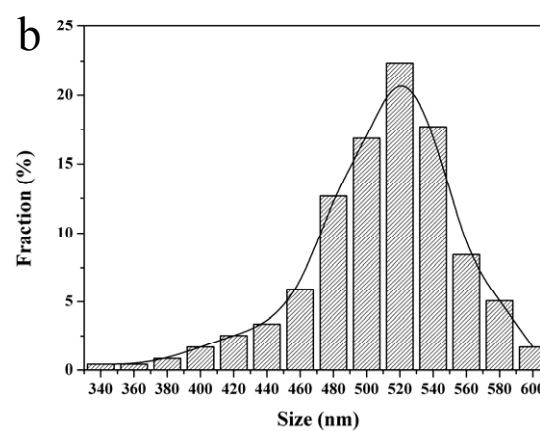
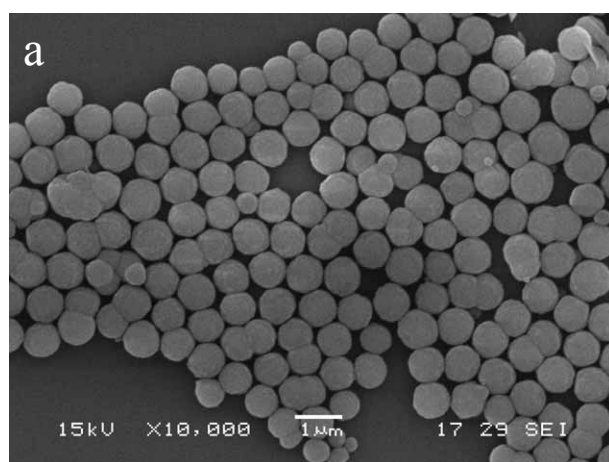
E-mail address: yhzhu@ecust.edu.cn (Y. Zhu)



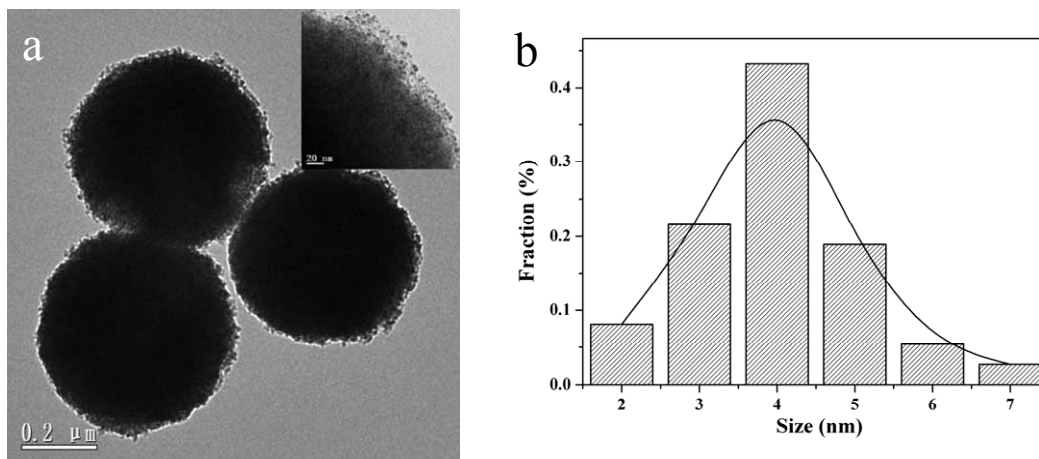
**Fig. S1** TEM image of Fe<sub>3</sub>O<sub>4</sub> particles, inset is the enlarged TEM image.



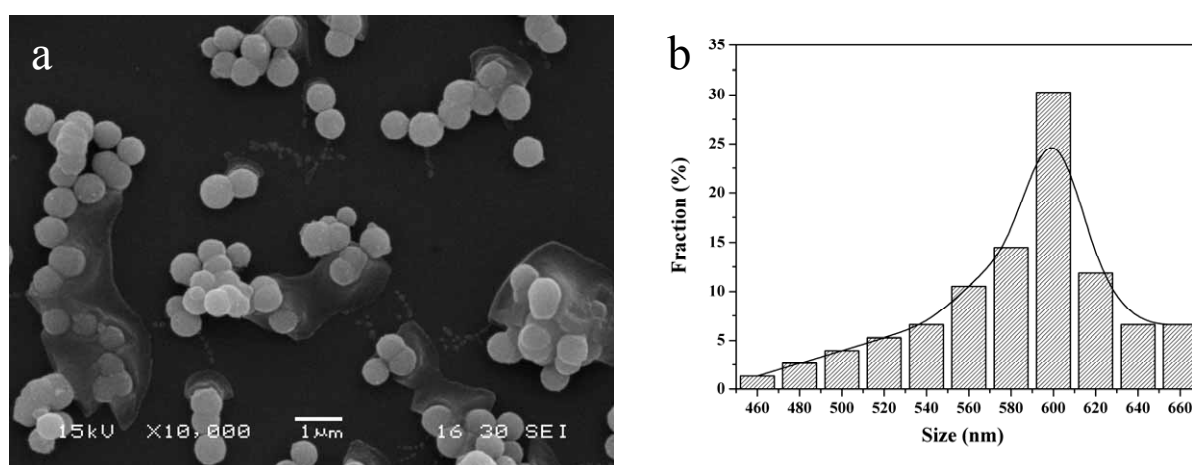
**Fig. S2** (a) SEM image of Fe<sub>3</sub>O<sub>4</sub> particles. (b) Diameter distribution of Fe<sub>3</sub>O<sub>4</sub> particles.



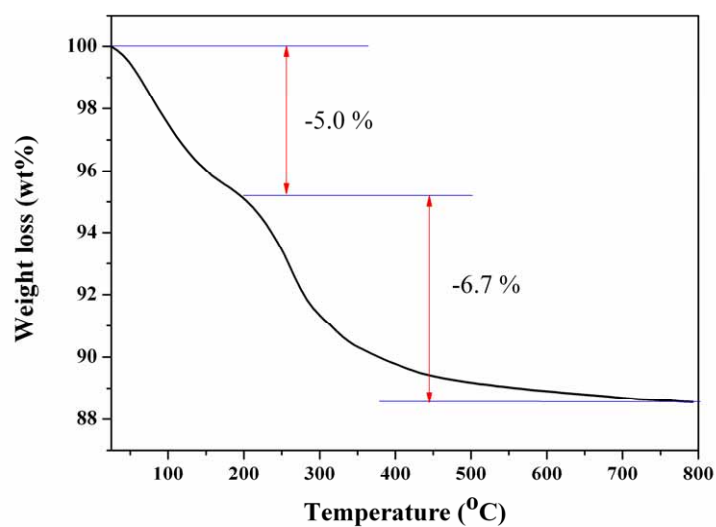
**Fig. S3** (a) SEM image of Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub> microspheres. (b) Diameter distribution of Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub> microspheres.



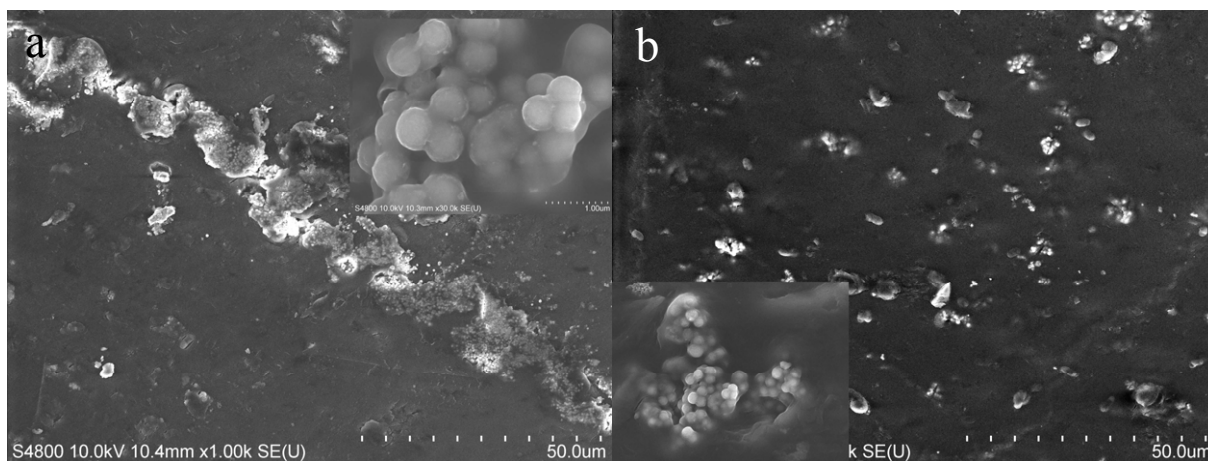
**Fig. S4** (a) TEM image of Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub>@Au-seed microspheres, inset is the enlarged TEM image. (b) Column plot of gold nanoparticles size distribution on Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub>@Au-seed microspheres



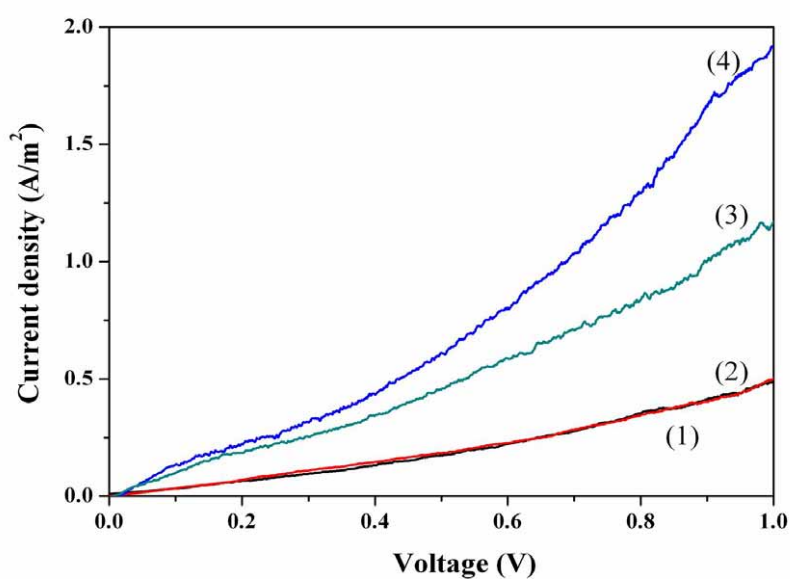
**Fig. S5** (a) SEM image of Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub>@Au microspheres. (b) Diameter distribution of Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub>@Au microspheres.



**Fig. S6** TGA curve of rGOE-Ms.



**Fig. S7** SEM images of (a) the anisotropic conductive film (ACF) and (b) the isotropic conductive film (ICF), respectively. The insets are high-magnification SEM images.



**Fig. S8** J–V characteristics of (1) the vertical and (3) the horizontal ACF assembled by  $\text{Fe}_3\text{O}_4@\text{SiO}_2@\text{rGO}$ , (2) the vertical and (4) the horizontal ACF assembled by  $\text{Fe}_3\text{O}_4@\text{SiO}_2@\text{Au}@GO$ .